

CLAIMS

1. Method for increasing the density of a perovskite, which comprises the steps of:
 - (a) placing a perovskite feedstock in a high-pressure cell of a high pressure/high temperature (HP/HT) apparatus;
- 5 (b) subjecting said feedstock to pressures in excess of about 2 Kbar and temperatures above about 800° C for time in excess of 3 minutes to produce an cubic perovskite product having a density which is greater than said preform; and
- 10 (b) recovering said perovskite product.
2. The method of claim 1, wherein said perovskite can be represented by the structure, ABO_3 , where:

A is one or more of Na^+ , K^+ , Rb^+ , Ag^+ , Ca^{+2} , Sr^{+2} , Ba^{+2} , Pb^{+2} , La^{+3} , Pr^{+3} , Nb^{+3} , Bi^{+3} , Y^{+3} , Ce^{+4} , or Th^{+4} , and
- 15 B is one or more of Li^+ , Cu^{+2} , Mg^{+2} , Ti^{+3} , V^{+3} , Cr^{+3} , Mn^{+3} , Fe^{+3} , Co^{+3} , Al^{+3} , Ni^{+3} , Rh^{+3} , Hf^{+4} , Ti^{+4} , Zr^{+4} , Mn^{+4} , Ru^{+4} , Pt^{+4} , Nb^{+5} , Ta^{+5} , Mo^{+6} , or W^{+6} .
3. The method of claim 2, wherein said preform is $SrRuO_3$.
- 20 4. The method of claim 1, wherein said perovskite feedstock is one or more of powder or a preform.
5. The method of claim 1, wherein said perovskite product has a density of greater than about 60% of its theoretical density.
- 25 6. The method of claim 5, wherein said perovskite product has a density of greater than about 90% of its theoretical density.
7. The method of claim 1, wherein step (b) is conducted for a time ranging
- 30 from between about 3 minutes and 24 hours.
8. The method of claim 1, wherein said pressure ranges from about 2 to 75 Kbar and said temperature ranges from about 800° to 1600° C.
- 35 9. The method of claim 7, wherein said pressure ranges from about 2 to 75 Kbar and said temperature ranges from about 800° to 1600° C.

10. The densified perovskite product produced according to the process of claim 1.
- 5 11. The densified perovskite product produced according to the process of claim 2.
12. The densified perovskite product produced according to the process of claim 3.
- 10 13. The densified perovskite product produced according to the process of claim 4.
14. The densified perovskite product produced according to the process of claim 5.
- 15 15. The densified perovskite product produced according to the process of claim 6.
- 20 16. The densified perovskite product produced according to the process of claim 7.
17. The densified perovskite product produced according to the process of claim 8.
- 25 18. The densified perovskite product produced according to the process of claim 9.
19. Method for increasing the density of a perovskite, which comprises the steps of:
- 30 (a) placing a perovskite feedstock in a high-pressure cell of a high pressure/high temperature (HP/HT) apparatus;
- (b) subjecting said feedstock to pressures in excess of about 2 Kbar and temperatures above about 800° C for time adequate to increase the density of said feedstock to above about 60% of its theoretical density; and
- 35

- (b) recovering said perovskite product having a density above about 60% of it theoretical density.

20. The method of claim 19, wherein said perovskite can be represented by the structure, ABO_3 , where:
- 5 A is one or more elements of Na^+ , K^+ , Rb^+ , Ag^+ , Ca^{+2} , Sr^{+2} , Ba^{+2} , Pb^{+2} , La^{+3} , Pr^{+3} , Nb^{+3} , Bi^{+3} , Y^{+3} , Ce^{+4} , or Th^{+4} ; and
- B is one or more elements of Li^+ , Cu^{+2} , Mg^{+2} , Ti^{+3} , V^{+3} , Cr^{+3} , Mn^{+3} , Fe^{+3} , Co^{+3} , Al^{+3} , Ni^{+3} , Ni^{+3} , Rh^{+3} , Hf^{+4} , Ti^{+4} , Zr^{+4} , Mn^{+4} , Ru^{+4} , Pt^{+4} , Nb^{+5} , Ta^{+5} , Mo^{+6} , or W^{+6} .
- 10 21. The method of claim 19, wherein said preform is $SrRuO_3$.
22. The method of claim 19, wherein said perovskite feedstock is one or more of powder or a preform.
- 15 23. The method of claim 19, wherein said perovskite product has a density of greater than about 90% of its theoretical density.
- 20 24. The method of claim 19, wherein step (b) is conducted for a time ranging from between about 3 minutes and 24 hours.
- 25 25. The method of claim 19, wherein said pressure ranges from about 2 to 75 Kbar and said temperature ranges from about 800° to 1600° C.
26. The method of claim 25, wherein said pressure ranges from about 2 to 75 Kbar and said temperature ranges from about 800° to 1600° C.